

**Measurements Status for
21Q40 Quadrupoles,
21CS26 Sextupole Correctors
and
27CDM30 Correctors**

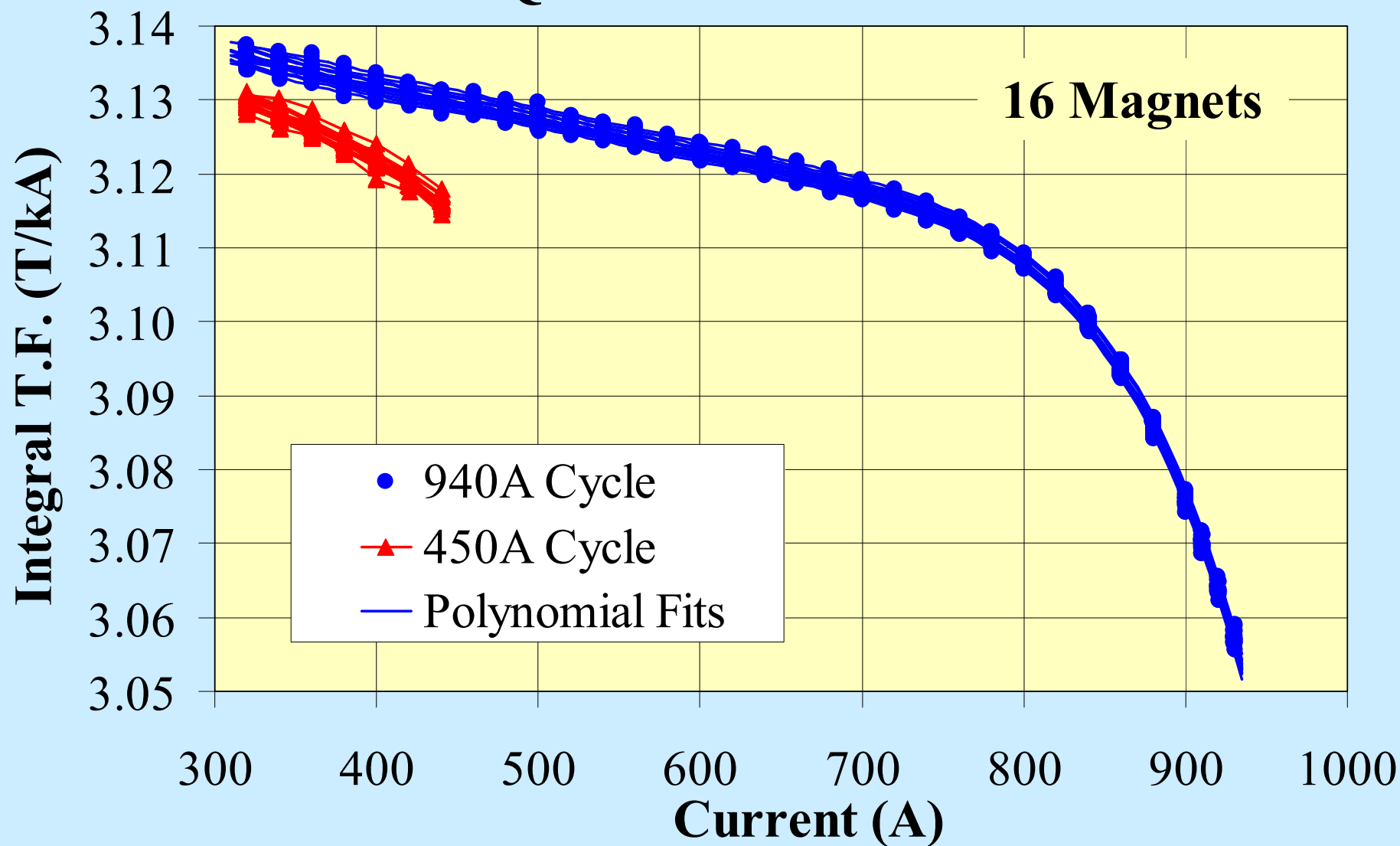
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SNS AP Video Conference, January 28, 2003

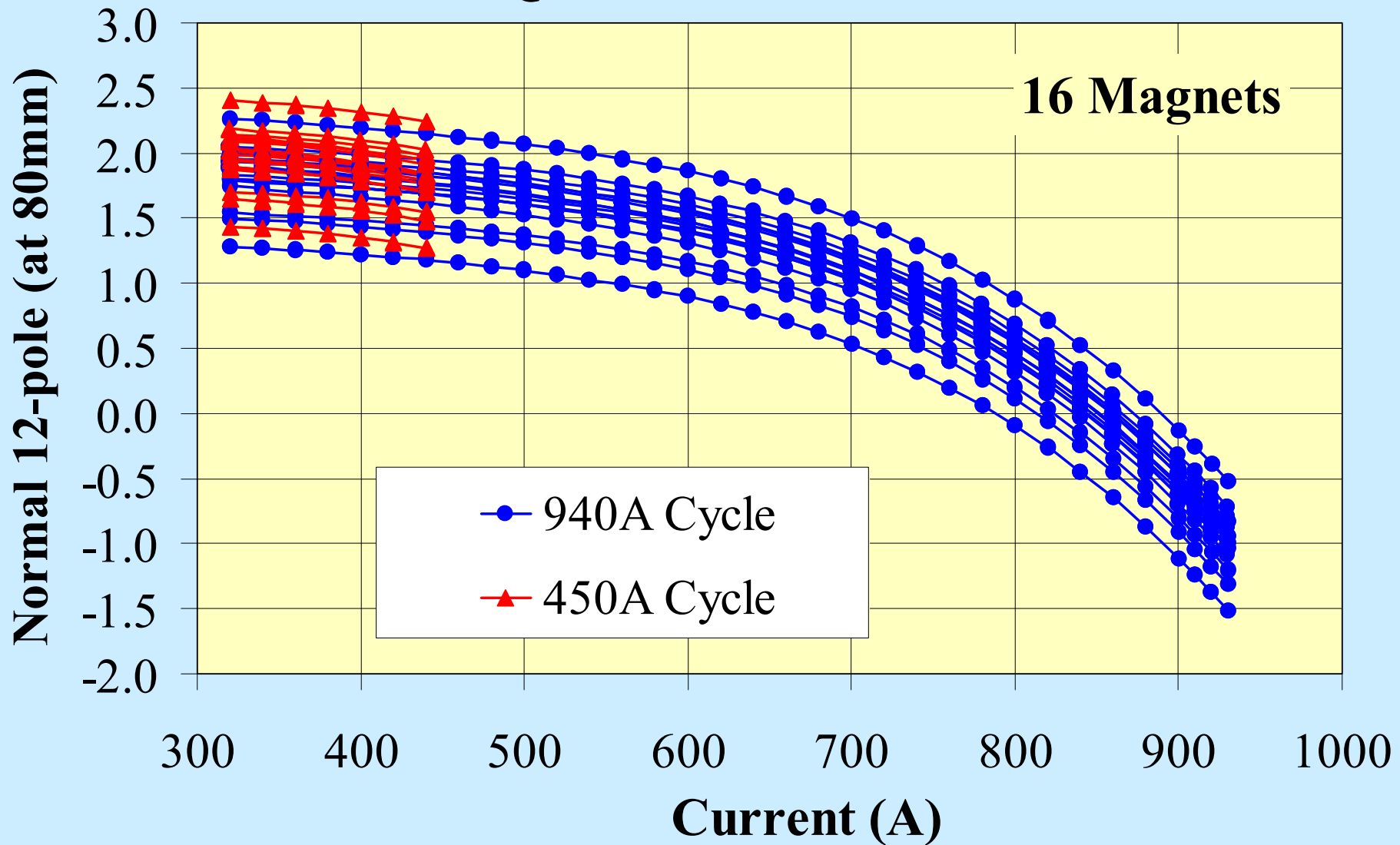
21Q40 Quadrupoles

- Measurements in a few initial quadrupoles had larger than tolerable noise in the current ($\sim 0.02\%$). A polynomial fit to the integral transfer function (ITF) was used to get around this problem.
- Power supply repairs, as well as incorporation of a better sampling of current during the measurements (using a dedicated voltmeter) have solved this problem.
- A polynomial fit is still implemented to interpolate the ITF at the current levels of interest for 1.0 and 1.3 GeV operation.

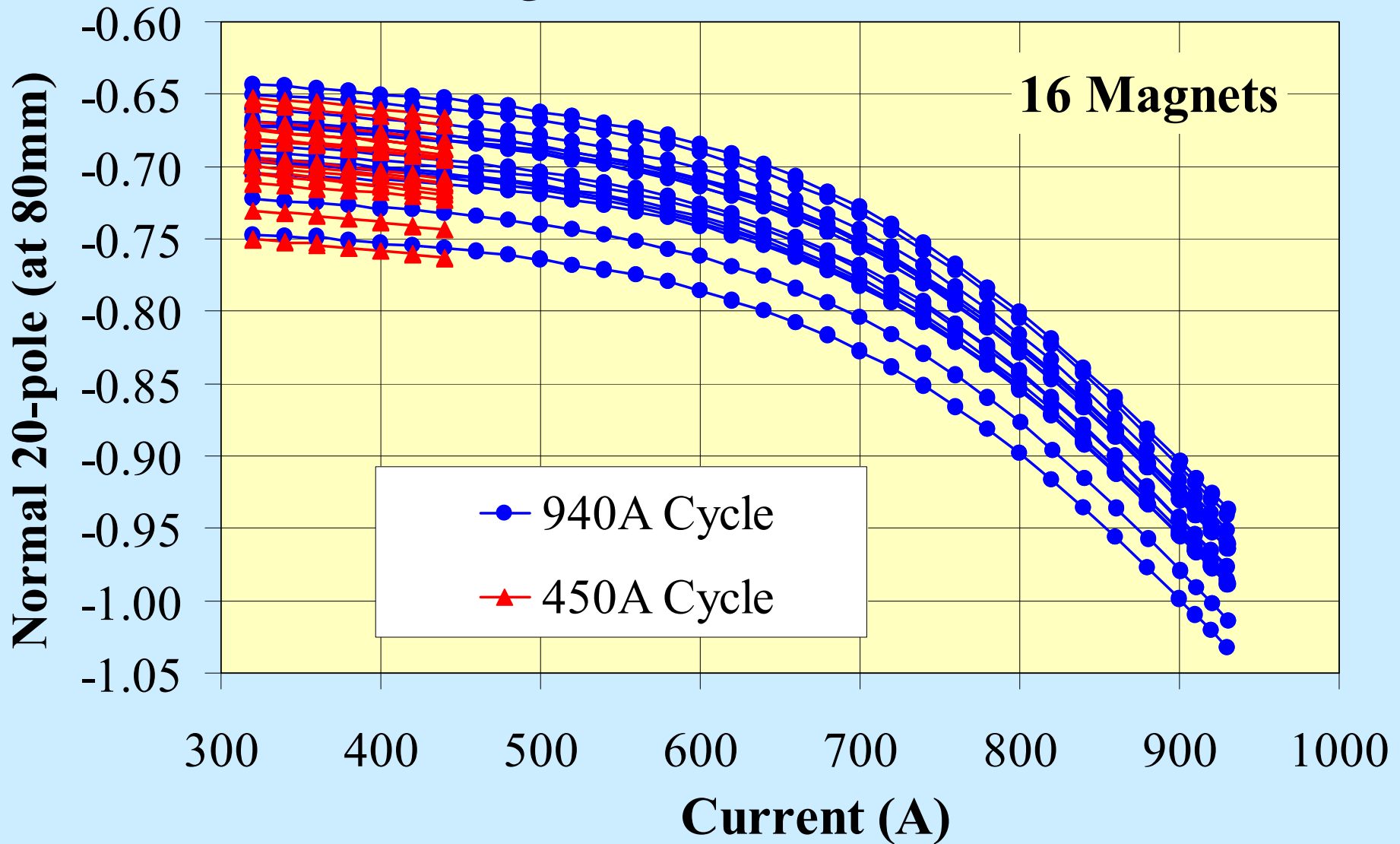
21Q40: Excitation Curves



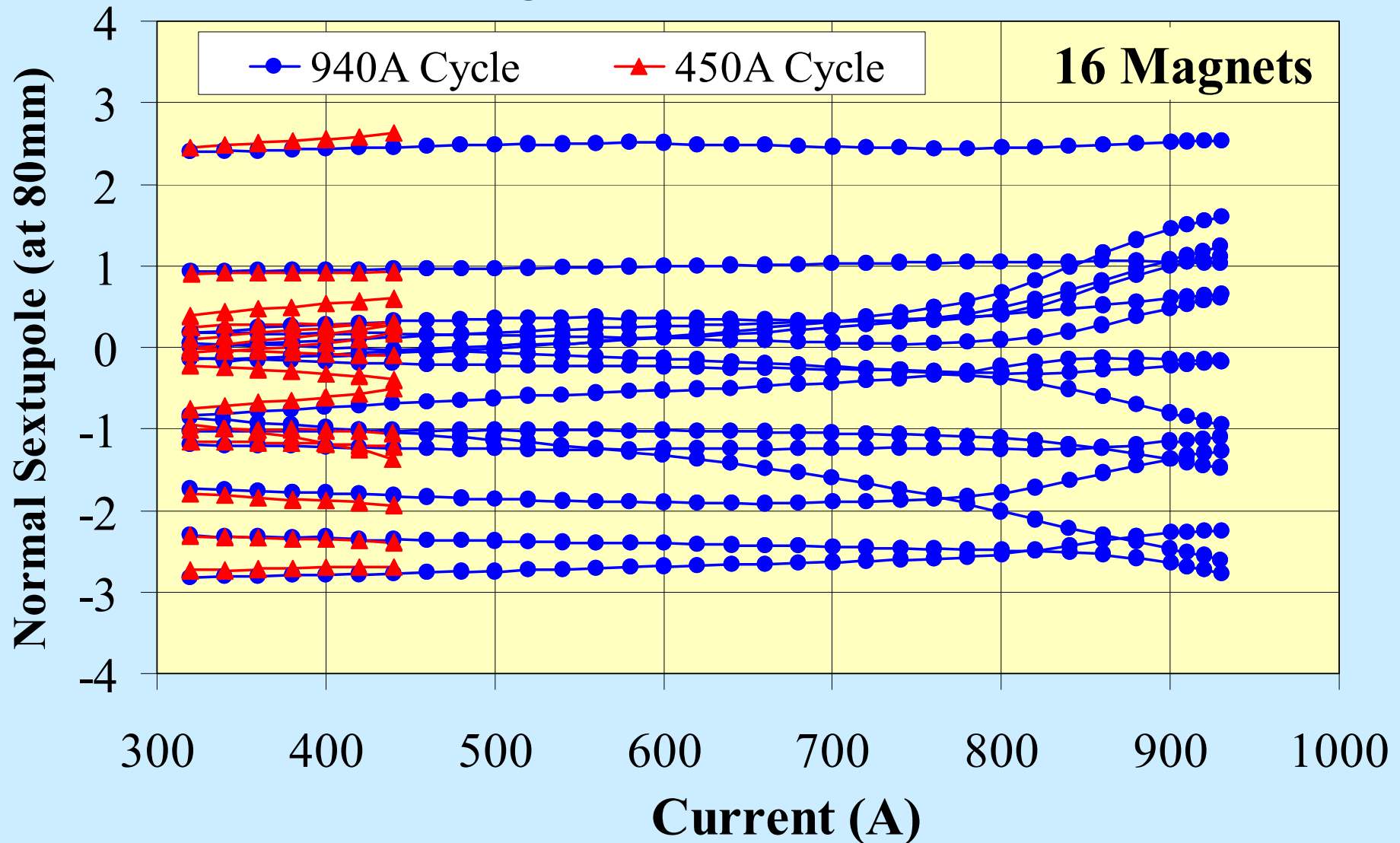
21Q40: Excitation Curves



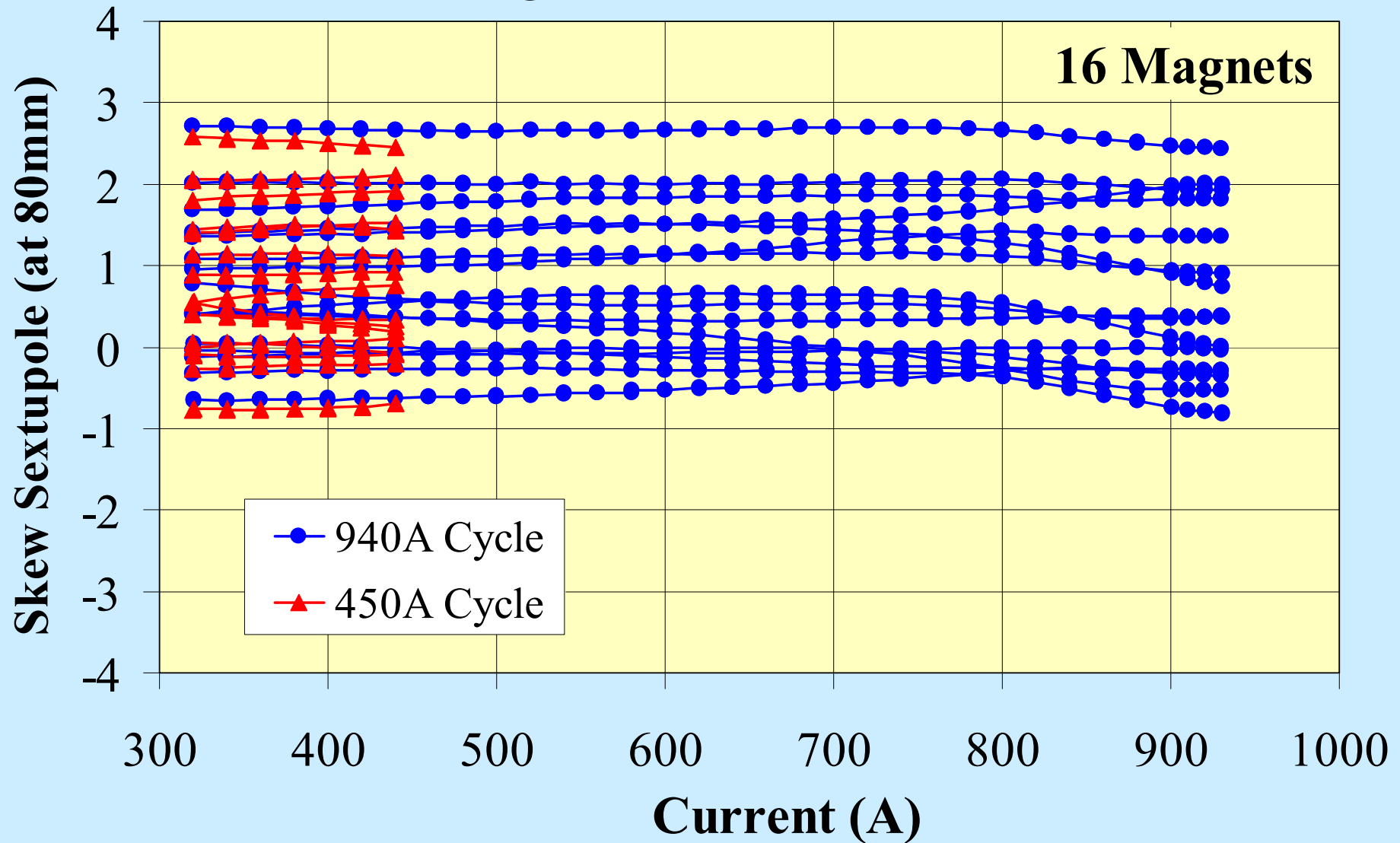
21Q40: Excitation Curves

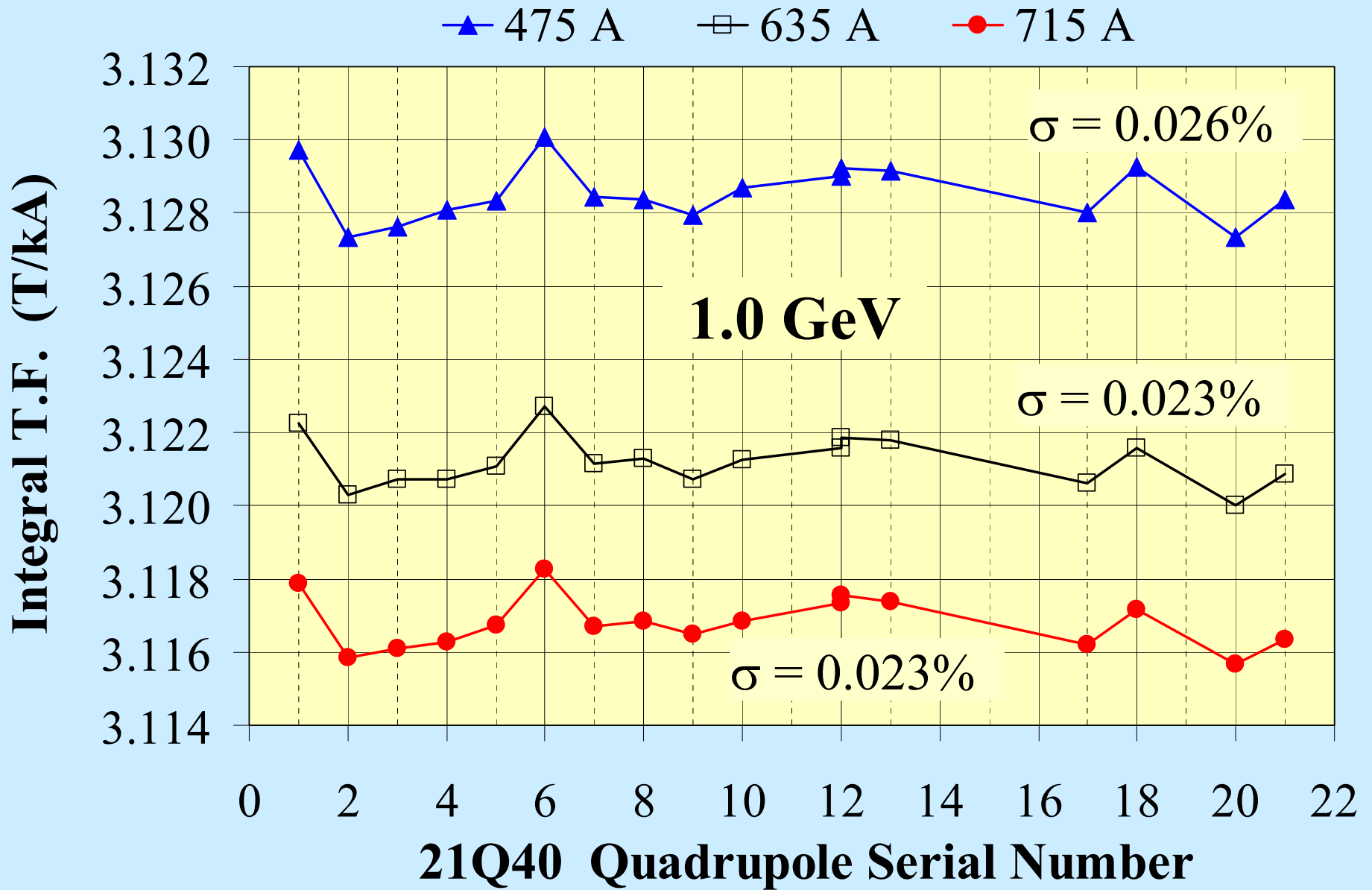


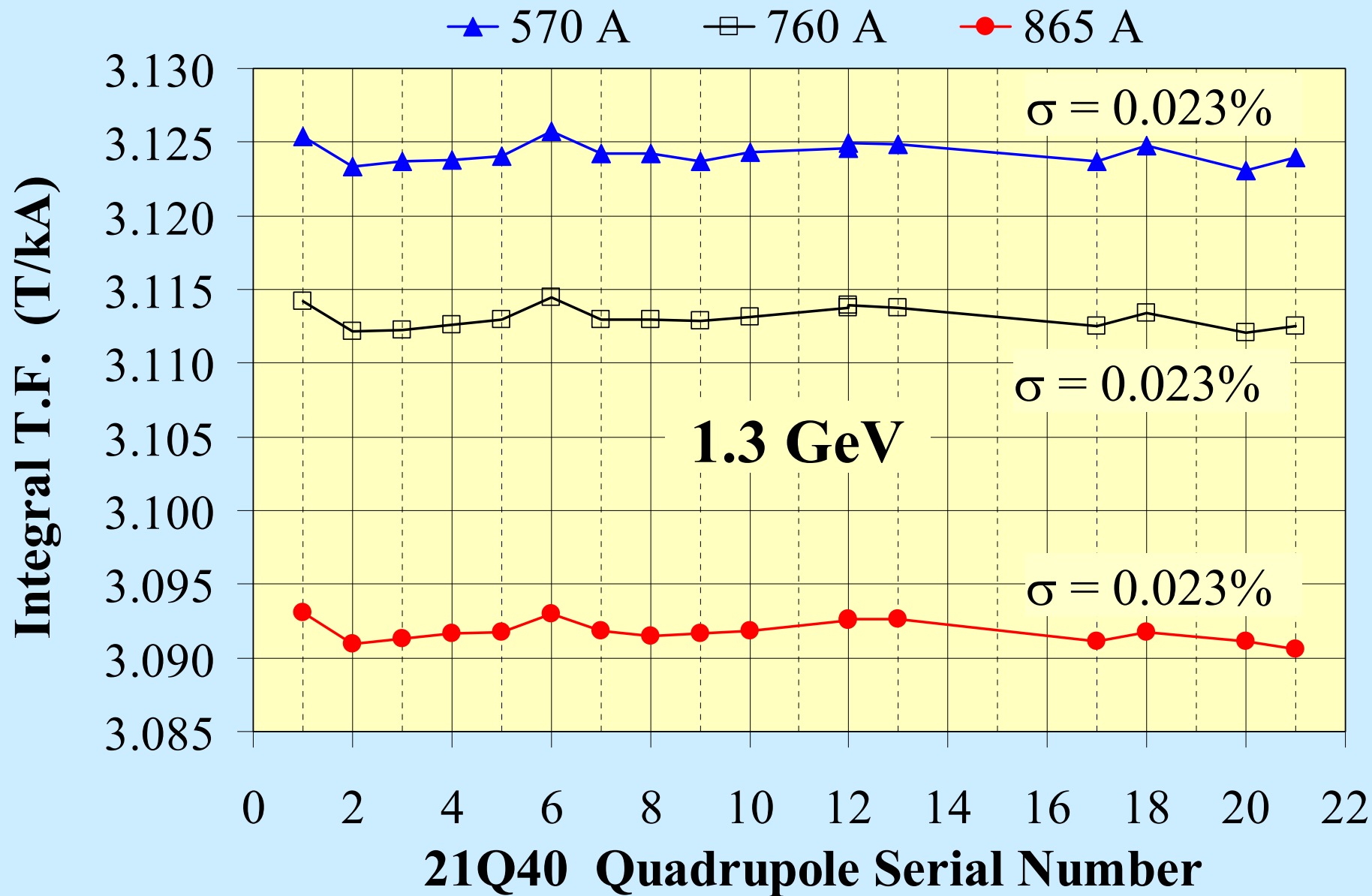
21Q40: Excitation Curves



21Q40: Excitation Curves



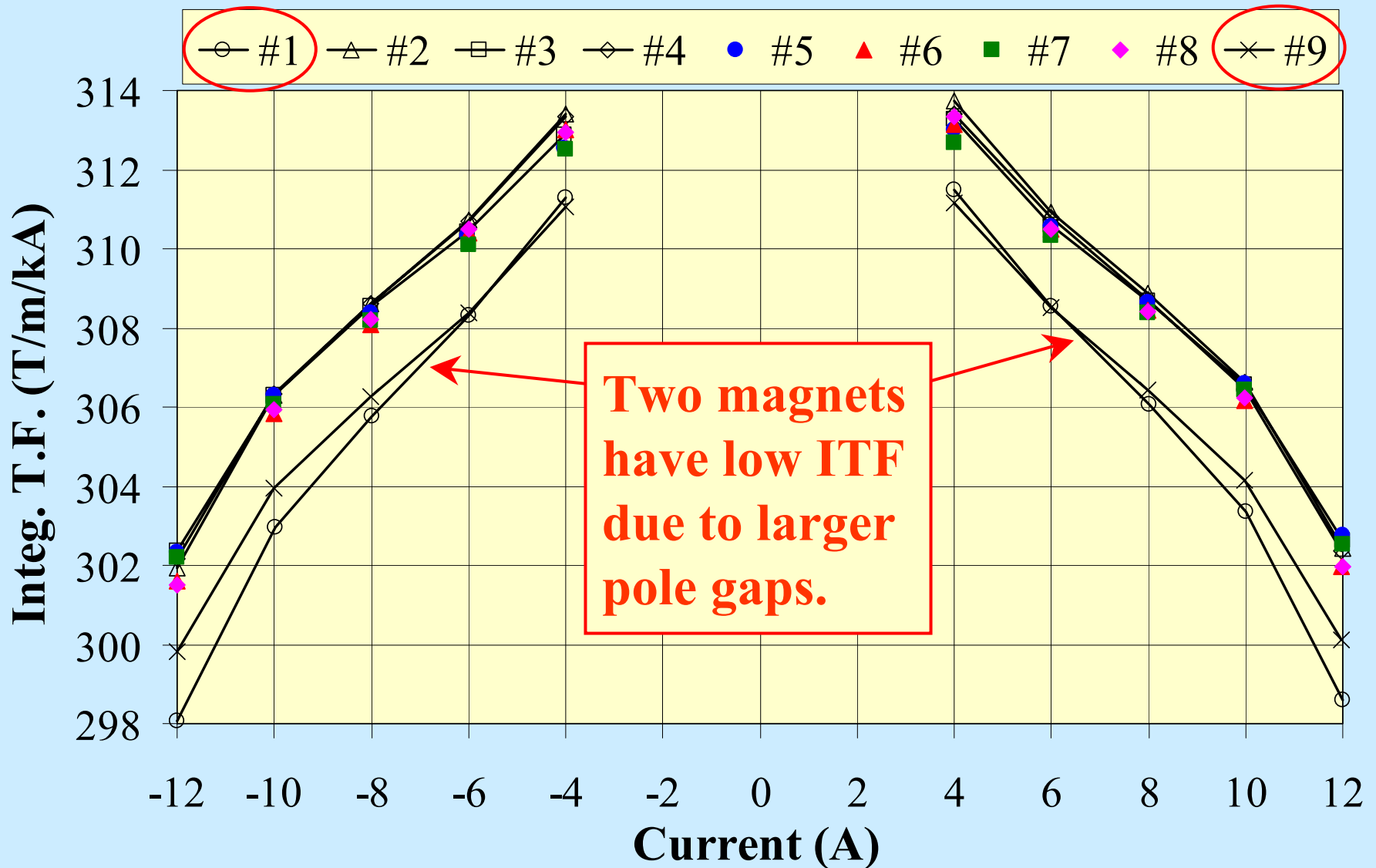




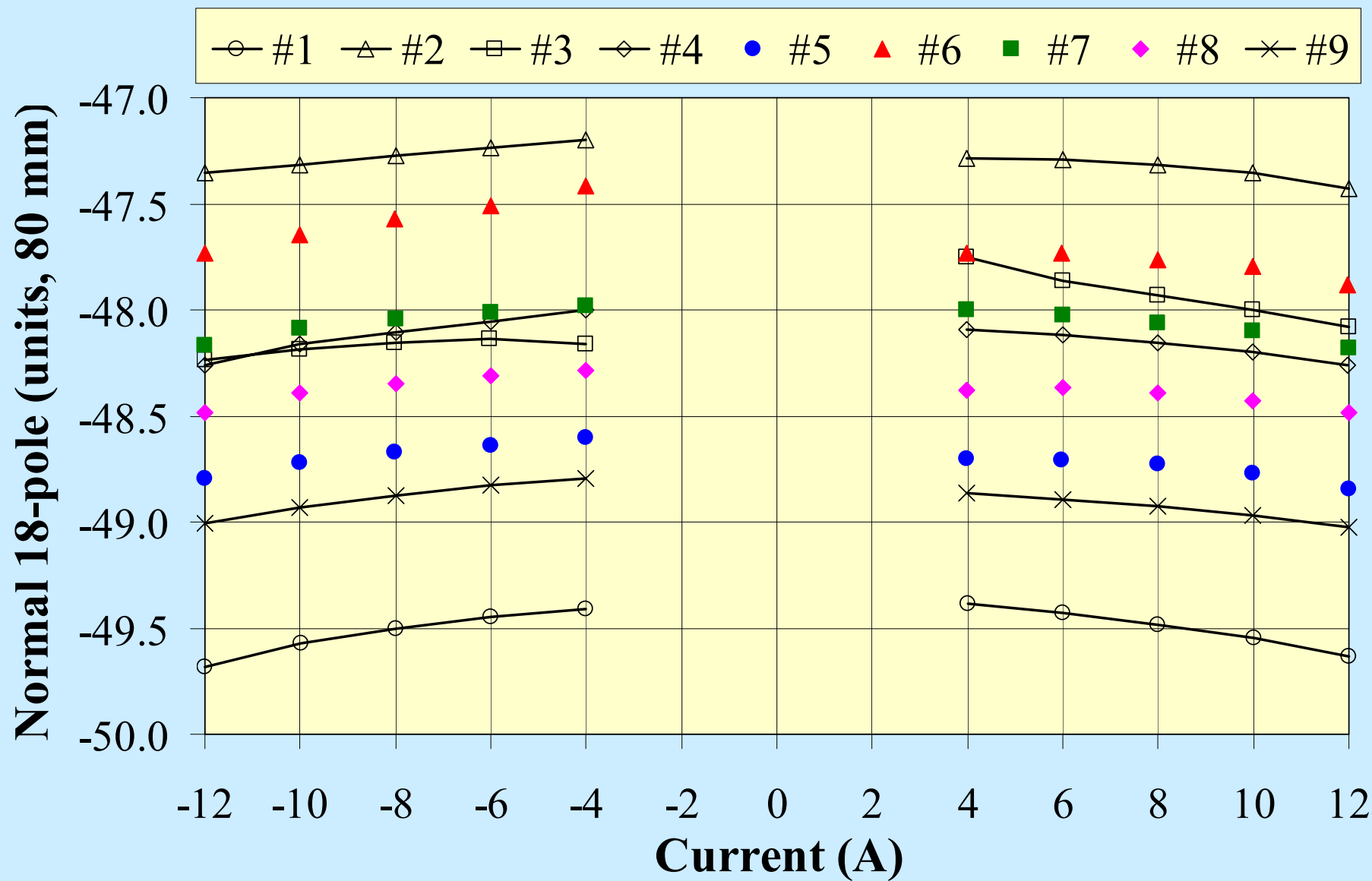
21CS26 Sextupole Correctors

- All nine of these sextupole correctors have been measured.
- Measurements were made with the same rotating coil which is used for the 21Q40 quadrupoles (88.6 mm radius, 1.78 m long).
- Magnet was cycled to ± 12 A. Measurements were made from +12 A to +4 A, and from -12 A to -4 A in 2 A steps. Five readings were averaged at each current.

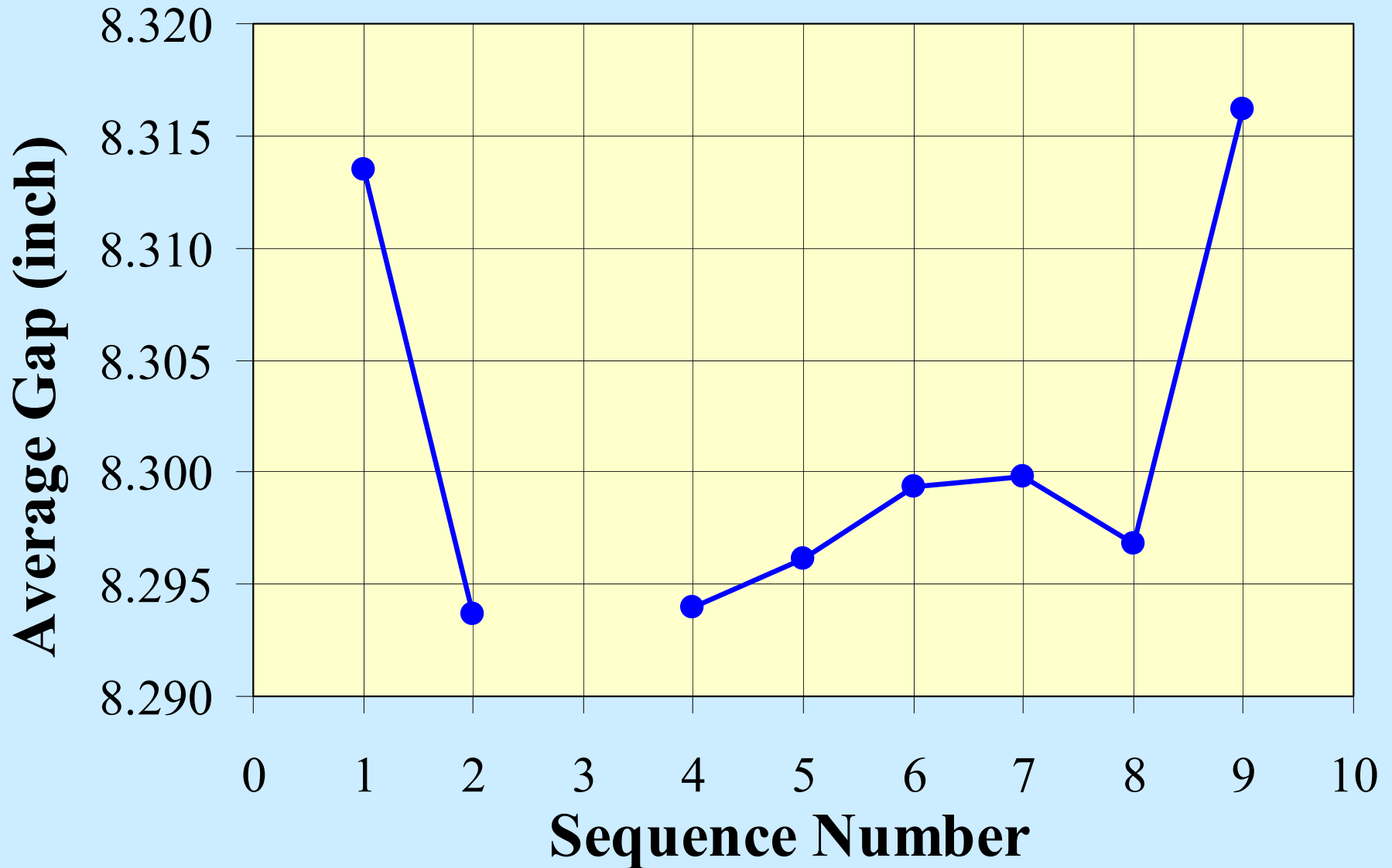
Integral Transfer Function in 21CS26 Sextupoles



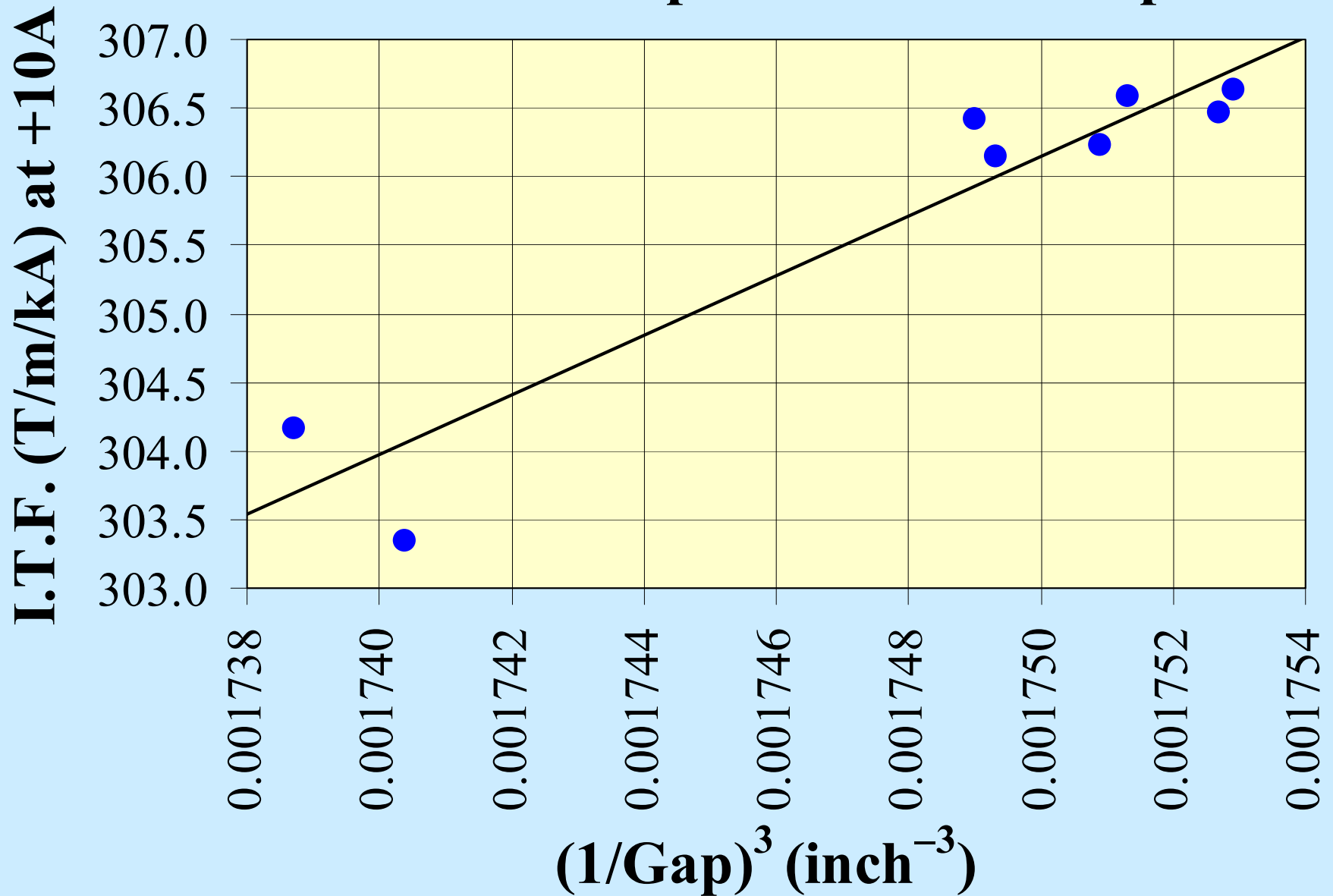
Normal 18-pole in 21CS26 Sextupoles



Gap Measurements in 21CS26 Sextupoles



I.T.F. Vs Gap in 21CS26 Sextupoles



Summary of Field Quality in 21CS26 Sextupoles at +10 A

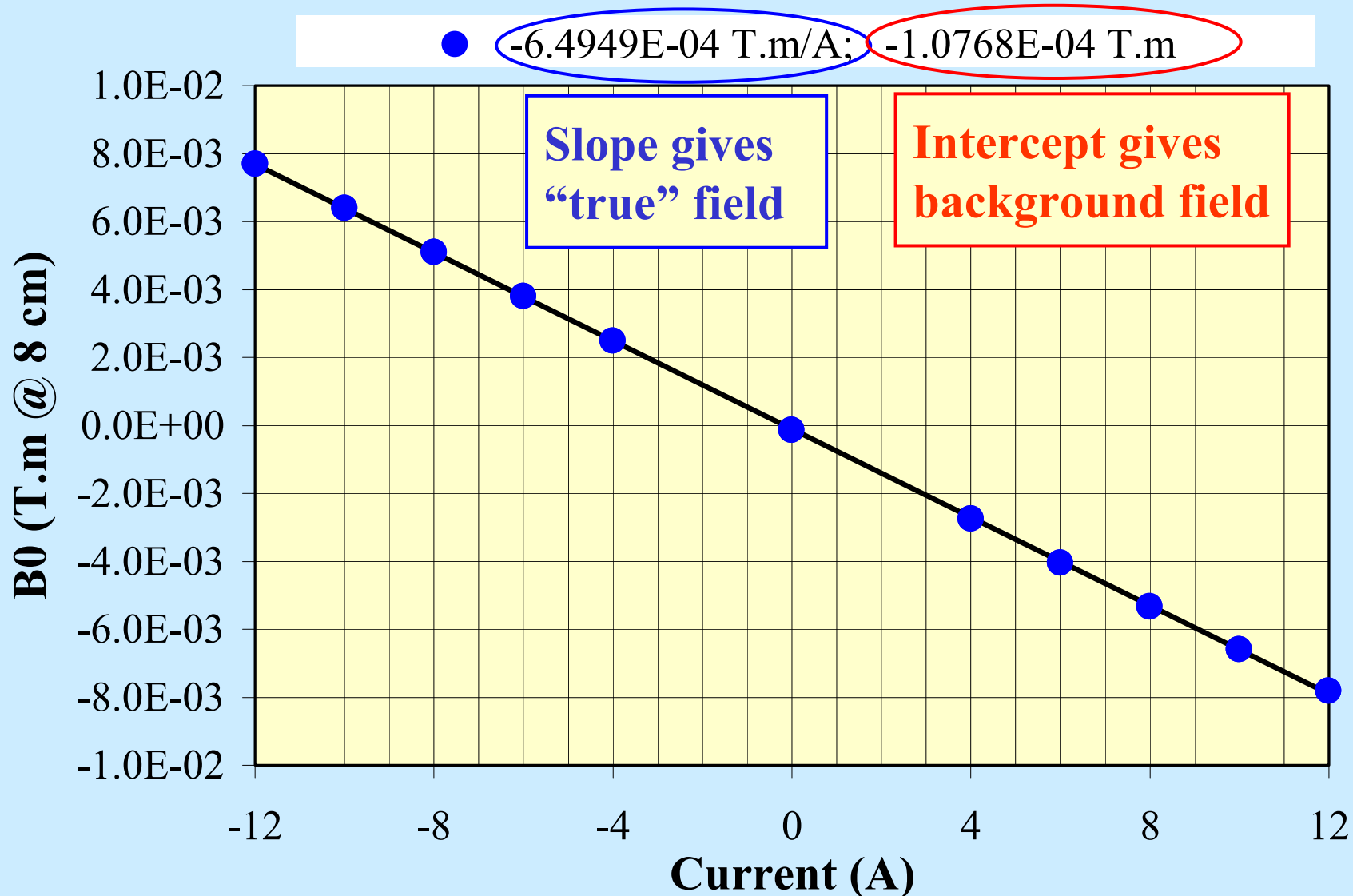
Magnet	Integ. T.F. (T/m/kA)	No. of σ from mean	b8 at 80mm (unit)
SCS211	303.35	-16.54	-49.55
SCS212	306.63	1.05	-47.35
SCS213	306.58	0.75	-48.00
SCS214	306.46	0.14	-48.20
SCS215	306.59	0.81	-48.77
SCS216	306.15	-1.53	-47.80
SCS217	306.42	-0.07	-48.10
SCS218	306.22	-1.15	-48.43
SCS219	304.16	-12.17	-48.97
Average=	306.44		-48.35
Std.Dev.=	0.061%		0.66

Standard deviation in ITF excludes the two magnets with low ITF.

27CDM30 Correctors

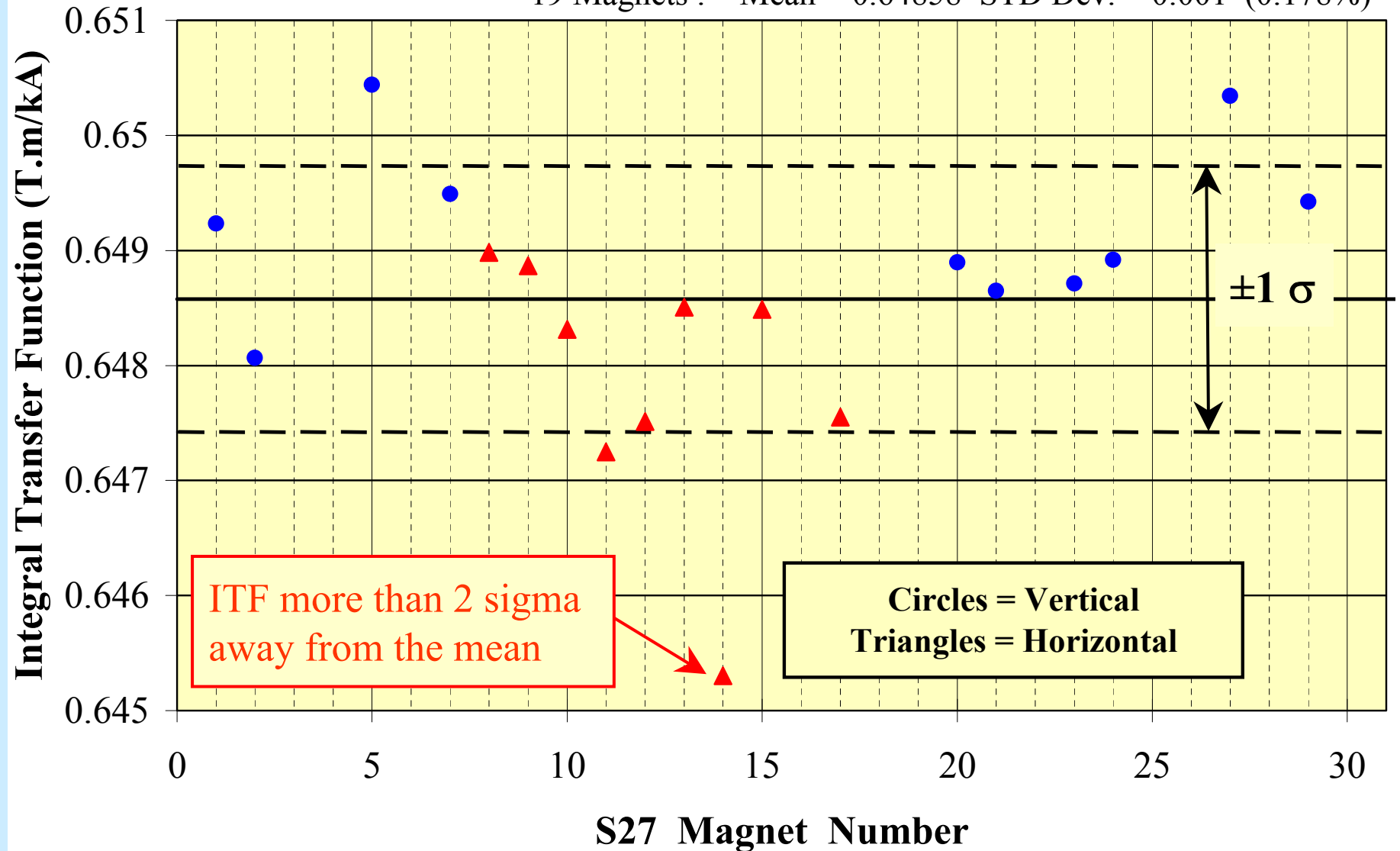
- Measured with the 88.6 mm radius, 1.78 m long rotating coil (same as used for 21Q40).
- Each magnet has one dipole, one skew quadrupole and one skew sextupole circuit. The dipoles may be configured as either a horizontal or a vertical dipole.
- Measurements are made on the down ramp from +12 A to -12 A in 2 A steps. A single value of each harmonic is derived from the data by a straight line fit. This is done to eliminate background fields.
- A total of 19 corrector magnets have been measured (10 vertical and 9 horizontal dipoles).

DC loop Dn Ramp (+12A to -12A) in S27C07 Vertical Dipole (Run 12)



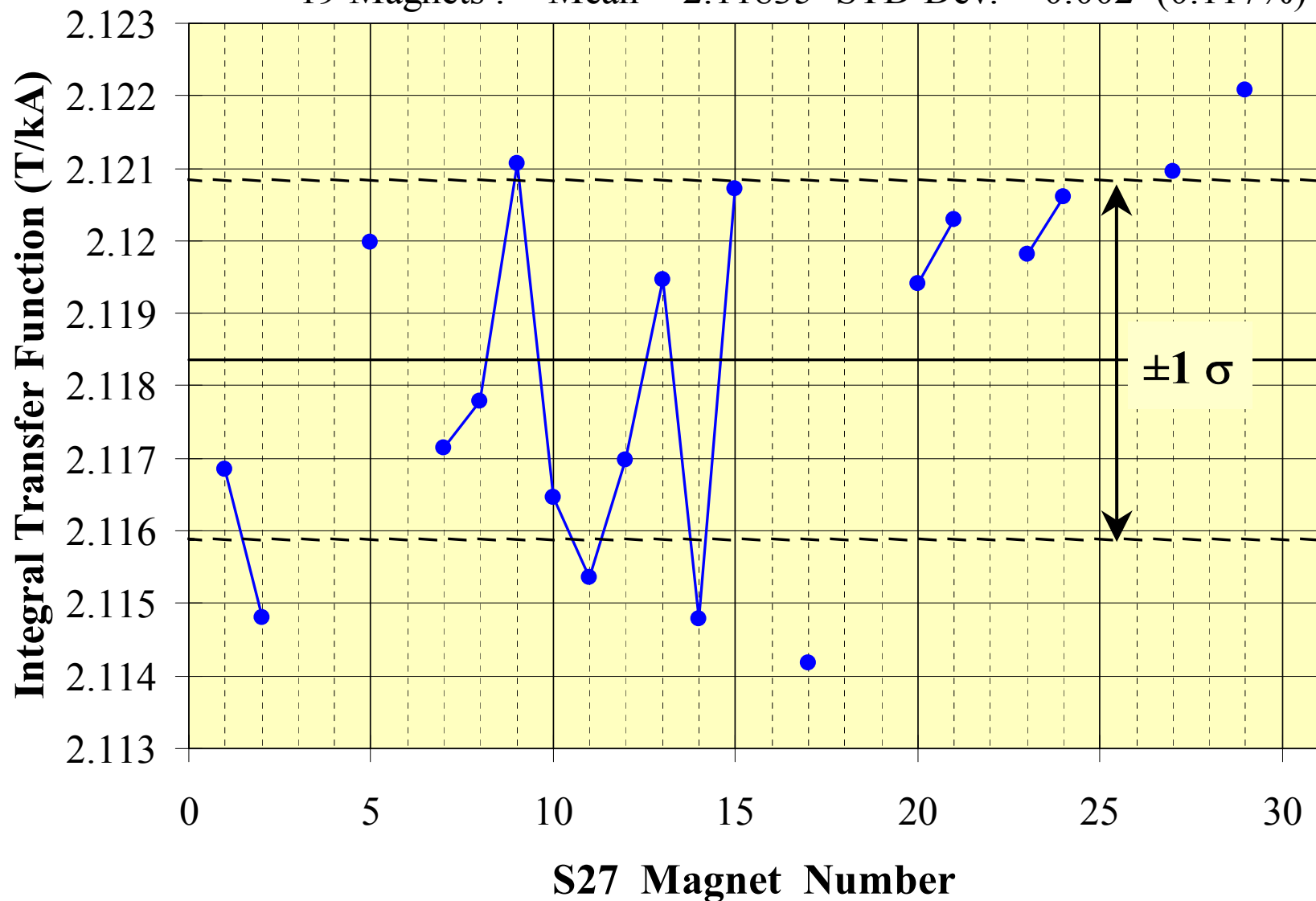
27CDM All Dipoles -- Dn Ramp +12A to -12A Avg.

19 Magnets : Mean = 0.64858 STD Dev. = 0.001 (0.178%)



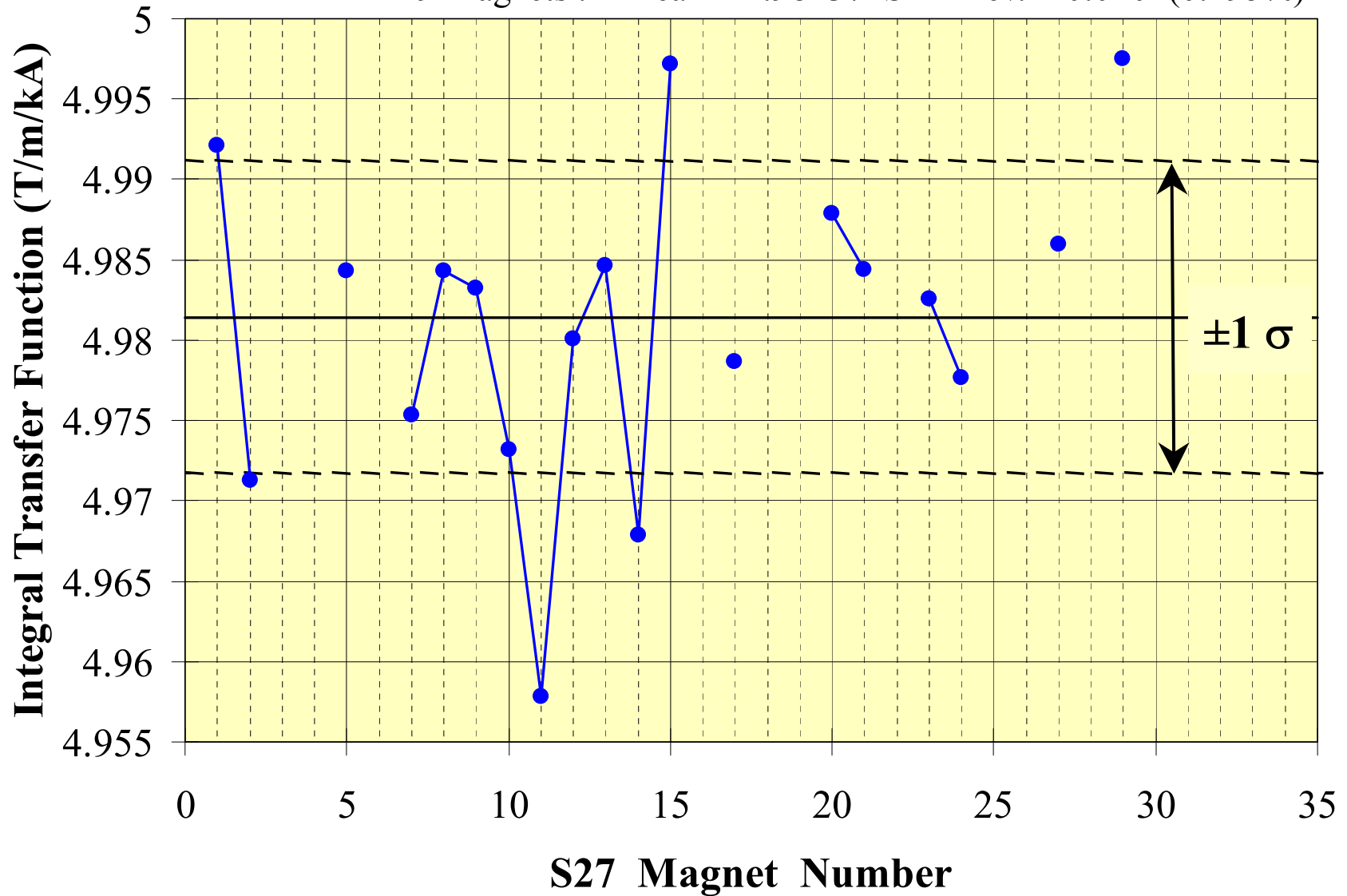
27CDM Skew Quadrupole -- Dn Ramp +12A to -12A Avg.

19 Magnets : Mean = 2.11835 STD Dev. = 0.002 (0.117%)



27CDM Skew Sextupole -- Dn Ramp +12A to -12A Avg.

19 Magnets : Mean = 4.98137 STD Dev. = 0.010 (0.195%)



Summary of Field Quality in 27CDM30 Correctors

I.T.F. is in units of Tesla.m⁽²⁻ⁿ⁾/kA, where $n=1$ for dipole, etc.

$|b_n + ia_n|$ are given in percent of the main field at 80 mm radius.

19 Magnets are included in this tabulation.

	Dipole		Skew Quad		Skew Sextupole	
Harmonic	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
I.T.F.	0.6486	0.18%	2.1184	0.12%	4.9814	0.19%
Dipole	100%	0.0%	0.00%	0.00%	0.74%	0.34%
Quadrupole	0.05%	0.04%	100%	0.0%	0.00%	0.00%
Sextupole	0.55%	0.03%	0.04%	0.03%	100%	0.0%
Octupole	0.00%	0.00%	0.02%	0.01%	0.14%	0.08%
Decapole	0.03%	0.00%	0.01%	0.00%	6.49%	0.06%
12-pole	0.00%	0.00%	0.16%	0.00%	0.03%	0.01%
14-pole	0.01%	0.00%	0.00%	0.00%	2.23%	0.01%
16-pole	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%
18-pole	0.00%	0.00%	0.00%	0.00%	0.73%	0.01%
20-pole	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
22-pole	0.00%	0.00%	0.00%	0.00%	0.12%	0.00%
24-pole	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
26-pole	0.00%	0.00%	0.00%	0.00%	0.04%	0.00%
28-pole	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
30-pole	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%

Summary

- Measurements of 21Q40 quadrupoles are in progress. 16 magnets have been measured. Problem of noise in ITF has been eliminated.
- All 21CS26 corrector sextupoles have been measured (nine total).
- 19 of the 27CDM30 correctors have been measured. The test stand is currently being used for 21Q40 quadrupoles.
- No serious problems with field quality have been observed.